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Adolescent Bullying and Sleep Difficulties

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Abstract

This study evaluated whether adolescents who report having been bullied, being bullies, or report both being a bully and being bullied experience more sleep difficulties than children uninvolved in bullying. The study drew upon cognitive theories of insomnia, investigating whether the extent to which young people report worrying about bullying can moderate associations between victimization and sleep difficulties. Participants were 5420 adolescents who completed a self-report questionnaire. Pure Victims (OR = 1.72, 95% CI [1.07, 2.75]), Pure Bullies (OR = 1.80, 95% CI [1.16, 2.81]), and Bully-Victims (OR = 2.90, 95% CI [1.17, 4.92]) were all more likely to experience sleep difficulties when compared to uninvolved young people. The extent to which young people reported worrying about being bullied did not moderate the links between victimization and sleep difficulties. In this way, bullying is clearly related to sleep difficulties among adolescents but the conceptual reach of the cognitive model of insomnia in this domain is questioned.

Keywords: sleep difficulty, insomnia, peer-victimization, bullying, worry, logistic regression

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Adolescent Bullying and Sleep Difficulties

Bullying involves repeated acts of physical, verbal, and/or relationship-focused aggression, which take place in physical and/or electronic environments (Smith et al., 2008). Children and young people can be involved as a bully (those who use bullying behaviors), as a victim (those who experience bullying behaviors) or as a bully-victim (those who are both bullies and victims) (Boulton & Smith, 1994), and there is typically an imbalance of power between bullies and their victims during this repetitious and negative interaction (Olweus, 2012). Recent estimates suggest that around 22-33% of adolescents are bullied (Shakoor et al., 2012; Sourander et al., 2010) and this experience is associated with an array of negative psychological (Hawker & Boulton, 2000; Kochel, Ladd, & Rudolph, 2012), social (Kochel et al., 2012; Schoffstall & Cohen, 2011) and somatic (Gini & Pozzoli, 2009) outcomes. Young people engaging in bullying behaviors also display negative psychosocial wellbeing (e.g. Gini & Pozzoli, 2009; Rivers & Noret, 2013) and are at increased risk of later offending behavior (Ttofi, Farrington, Lösel, & Loeber, 2011).

There is evidence that one specific outcome, the experience of sleep difficulties, may also be related to involvement in bullying problems (see Table 1). Sleep difficulties include problems which can be symptomatic of clinical insomnia (APA, 2013), namely falling asleep, maintaining sleep, and engaging in a sufficient amount of restorative sleep. They affect around 25% of young people, of whom 5 – 10% meet diagnostic criteria for insomnia (Johnson, Roth, Schultz, & Breslau, 2006; Roberts, Roberts, & Duong, 2008). Difficulties are persistent during adolescence (Kataria, Swanson, & Trevathan, 1987) and predict sleep difficulties in later life (Dregan & Armstrong, 2010). Sleep difficulties are themselves associated with numerous indices of maladjustment, including depression, anxiety, interpersonal functioning, life satisfaction, and somatic health (Alfano, Zakem, Costa, Taylor, & Weems, 2009; Gregory & Eley, 2005; Meijer, Reitz, Deković, van den Wittenboer, & Stoel, 2010; Roberts et al., 2008; Roberts, Roberts, & Xing, 2011).

Table 1

Studies Evaluating Associations Between Bullying Involvement and Sleep Difficulties

Study	Participants	Sleep Measure	Bullying Measure	Outcome
Biebl, DiLalla, Davis, Lynch, & Shinn (2011)	*N* = 65 to 85. American youth aged 5 years old at T1, then aged 10-18 at T2 and 12-20 at T3.	Self-report. Four items assessing difficulty getting to sleep, night-time awakenings, nightmares, peaceful nature of sleep.	Age 5 = Observations. Adolescence = Mynard & Joseph's (2000) self-report MPVS.	Chronic female victims experience more sleep problems than all other girls. No effect for boys. Chronic victims = those bullied at age 5, then twice, two years apart, during adolescence. Desisters = those bullied at 5, then at first time point in adolescence. Late-onset = only bullied in adolescence.
Fekkes, Pijpers, Fredriks, Vogels, & Verloove-Vanhorick (2006)	*N* = 1118. Dutch youth aged 9-11 years old. Two time points, 6-months apart.	Self-report. Single item: "Sleeping problems."	Self-report using the Olweus (1991) definition and response options.	Children bullied at T1 were 1.91 times more likely than not bullied children to report sleeping problems at T2. Sleeping problems at T1 did not predict being bullied at T2. Analyses controlled for age, gender, and number of friends.
Fleming & Jacobsen (2009)	*N* = 104,614. Youth were 13 and 15 years old from 19 low and middle income countries.	Self-report. Single item: "During the past 12 months, how often have you been so worried about something that you could not sleep at night?"	Self-report: 'During the past 30 days, how many days were you bullied?'	Bullied students more likely to report trouble sleeping: 75.5% vs 60.7% of non-bullied adolescents.
Hildenbrand, Daly, Nicholls, Brooks-Holliday, & Kloss (2013)	*N* = 14,782 adolescents from the 2009 National Youth Risk Behavior Survey in N. America.	Self-report. Single item: "On an average school night, how many hours of sleep do you get?"	Self-report: "During the past 12 months, have you ever been bullied *on school property*?"	Participants reporting <8 hours sleep were 1.35 times more likely to be bullied than those report >8 hours sleep. Controlled for sex, age, and race/ethnicity.
Sourander et al. (2010)	*N* = 2221 Finnish youth aged 13-16 years old.	Self-report. Single item: "During the past 6 months, have you experienced problems with falling asleep or sleeping?"	Self-report. Cyberbullying and cybervictimisation based on a 21-item scale; traditional bullying and victimisation assessed with 4 items based on Olweus (1991) definition and response options.	Adolescents with sleep problems "almost every night" were 3.1 times more likely to be a pure cybervictim, 1.5 times more likely to be a pure cyberbully, and 2.6 times more likely to be a cyberbully-victim than those reporting less frequent sleep problems. Those reporting sleep problems "once or twice a week" were 2.4 times more likely to be a cyberbully-victim than those reporting sleep problems less frequently. Controlled for sex, grade, family structure, city, and ethnicity.

Study	Participants	Sleep Measure	Bullying Measure	Outcome
Natvig, Albrektsen, & Qvarnstrøm (2001)	*N* = 856 Norwegian youth aged 13-15 years old.	Self-report. Single item assessing difficulty getting to sleep during the preceding 6 months.	Self-report based on the Olweus (1991) definition and response options.	Being a victim of bullying "Once or twice" not associated with sleep difficulty. Those who were victims "sometimes or more often" were 1.94 times more likely to report sleeplessness than non-victims, controlling for gender, age and school. This effect was not present after controlling for self-efficacy, social support, alienation and distress.
Houbre, Tarquinio, Thuillier, & Hergott (2006)	*N* = 291 French youth aged 9-12 years old.	Self-report. Four items assessing difficulty falling asleep and waking at night.	Self-report, Austin & Joseph's (1996) Peer-Victimization Scale and Bullying Behavior Scale.	No difference between pure bullies, pure victims, bully-victims and control group.
Holmberg & Hellberg (2008)	*N* = 3216 Swedish youth aged 13-18 years old.	Self-report. Single item: "Did you have sleeping problems last week?"	Self-report: "I have been bullied" and "I have bullied someone" (time period not specified)	Poor female sleepers 1.51 times more likely to be bullied than good sleepers (for boys, *OR* = 1.72). Poor female sleepers 2.50 times more likely to be bullies than good sleepers (for boys, *OR* = 1.63).
Tochigi et al. (2012)	*N* = 19,436 Japanese youth aged 12-18 years old.	Self-report. Two items, one relating to nocturnal sleep duration and one relating to irregular bedtimes.	Self-report. Two items: ''Have you been bullied within the past year?'', and ''Have you bullied others within the past year?''	Sleep not associated with pure victim, pure bully, or bully-victim status among 16-18 year olds. Among the younger group, those with <8 hours sleep were 1.55 times more likely to be pure victims compared to those with 6-8 hours sleep. Those with >8 hours sleep were 1.38 times more likely to be pure victims and 1.34 times more likely to be bully-victims. Those who "always" had an irregular bedtime were 1.25 times more likely to be a bully and 1.41 times more likely to be a bully-victim than those with less frequent irregular bedtimes.

However, the evidence linking sleep difficulties to bullying involvement is by no means conclusive. Examining Table 1, it is clear that very few investigations have controlled for known confounders. For example, caffeine intake, alcohol use, and drug abuse are all associated with sleep problems (Johnson & Breslau, 2001; Ludden & Wolfson, 2010; Roberts et al., 2011) yet, to our knowledge, no previous study has controlled for more than a very narrow range of variables such as age, gender, and number of friends. It is particularly important to control for symptoms of depression, given the link between these and sleep disturbance such that 89% of clinically depressed adolescents experience some form of sleep difficulty (Lewinsohn, Rohde, & Seeley, 1998). Using the present data set, we were able to control for a wide range of potential confounders: gender, school-stage, socioeconomic status, ethnicity, caffeine intake, exercise, symptoms of depression, whether young people smoked or drank alcohol, and whether they reported ever using illegal drugs.

In addition to dealing with confounding variables, we also focused on both victim and bully status. Of the nine studies in Table 1, only four have examined roles other than that of victim. Those studies indicate that young people who use bullying behaviors evidence sleep problems, though these relationships may weaken and disappear in late adolescence. Frequent sleep problems also increase the likelihood that adolescents will be involved in cyberbullying as a victim, bully, or bully-victim. Only Houbre et al. (2006) report finding no differences in sleep difficulties when comparing bullies, victims, bully-victims and uninvolved children. Thus, the degree to which involvement in bullying problems is uniquely associated with sleep difficulties remains unclear. The current study

aimed to investigate the relationship between involvement in bullying problems as a victim, a bully, or a bully-victim, and the presence of sleep difficulties after controlling for known confounding factors.

A related issue is the relationship between the cognitive processing of bullying experiences and any associated sleep difficulties. It is well-established that, among adults, cognitive factors influence sleep difficulties such as insomnia (Harvey, 2002), yet their role in adolescent sleep difficulties is much less clear (Alfano, Zakem, Costa, Taylor, & Weems, 2009). To date, no study has investigated whether specific cognitions related to peer-victimization might act as risk factors in the development or maintenance of sleep difficulties. Worry-based cognitions, that is, unproductive and repetitive thoughts (Muris, Roelofs, Meesters, & Boomsma, 2004) have been highlighted as important when considering sleep disturbance in childhood (Alfano et al., 2009; Gregory, Willis, Wiggs, Harvey, & STEPS team, 2008). Cognitive models of insomnia (Espie, 2002; Harvey, 2002) predict that such cognitions moderate the relationship between stressors and sleep difficulties, with that relationship being muted or absent when these cognitions are absent. That is, the impact of a potential stressor would depend considerably on whether the individual accords it salience as a negative event, ruminates about it, and dwells on its harmful consequences for the self. It follows that how an individual deals cognitively with experiences of peer-victimization should influence the impact of those experiences. One candidate cognitive process, worry, is associated with the experience of being bullied (Berthold & Hoover, 2000; Nishina, 2012; Nishina & Bellmore, 2010). To date, the proposition that the extent to which young people worry about being bullied may moderate the effects of bullying on sleep difficulties has not been assessed. Testing this prediction has the potential to inform not only our understanding of maladjustment relating to bullying, but also our understanding of the development of sleep difficulties across adolescence.

The purposes of the present study were therefore twofold. First, we sought to provide further evidence for the association of involvement in bullying with sleep disturbance in adolescence, taking into account known confounds. Second, we examined the proposition that any relationship between experiencing insomnia symptoms and victim status would be moderated by problem-specific rumination (worrying about being bullied).

Method

Database

This study was a secondary analysis of an existing data set, which comprised a survey completed by 5,420 adolescents in West Central Scotland. The aim of the survey was to provide a baseline of the health and well-being of secondary school students (S1 to S6; approximately aged 11 to 17 years old) from 11 mainstream secondary schools, including one alternative provision unit. The percentage of students in the schools who were registered for free school meals was 15.16% (range = 3 to 28.1%), which compares favorably to the national average in Scotland (17.8%: Scottish Government, 2010). The sample is described in Table 2. Students completed the survey during school hours during either October or November.

The data were originally collected on behalf of the UK National Health Service and the authors were not involved in its collection. Ethical approval was granted under the arrangements of the commissioning agency, which also approved the use of the (anonymised) data for secondary analysis. Permission to conduct the study in specific schools was then sought from Head Teachers of those schools. Parents were sent information sheets and were given the opportunity to withdraw their child from the study using an ‘opt-out’ procedure. Pupils themselves were given an information sheet concerning the study and were free to decline to participate if they so wished. Those

young people who took part were given a list of support services to allow them to seek help on matters that may have been of concern to them.

Table 2

Sample Characteristics

Variable	Sleep Group	
	Control	Sleep Difficulty
Gender (p = .002, φ_c = .04)		
Male	2,498 (49.2%)	98 (39.4%)
Female	2,578 (50.8%)	151 (60.6%)
School-stage		
S1	1,063 (20.9%)	36 (14.5%)
S2	1,040 (20.5%)	42 (16.9%)
S3	874 (17.2%)	45 (18.1%)
S4	970 (19.1%)	48 (19.3%)
S5	688 (13.5%)	50 (20.1%)
S6	449 (8.8%)	28 (11.2%)
Ethnicity (p < .001, φ_c = .05)		
White	4,982 (96.2%)	237 (91.5%)
Other	197 (3.8%)	22 (8.5%)
Alcohol (p < .001, φ_c = .07)		
Yes	2,961 (59.4%)	190 (74.8%)
No	2,022 (40.6%)	64 (25.2%)
Smoking (p < .001, φ_c = .12)		
Yes	462 (9.2%)	63 (25.9%)
No	4,538 (90.8%)	180 (74.1%)
Illegal drugs (p < .001, φ_c = .11)		
Yes	768 (15.4%)	83 (34.0%)
No	4,217 (84.6%)	161 (66.0%)
Drink tea/coffee (p = .017, φ_c = .03)		
Yes	181 (3.9%)	15 (7.1%)
No	4,514 (96.1%)	195 (92.9%)
Bullying Status (p < .001, φ_c = .20)		
Uninvolved	3,637 (78.6%)	114 (50.2%)
Pure Victim	380 (8.2%)	37 (16.3%)
Pure Bully	472 (10.2%)	34 (15.0%)
Bully-Victim	141 (3.0%)	42 (18.5%)
Worry about being bullied (p < .001, φ_c = .08)		
Yes	759 (15.4%)	73 (29.7%)
No	4,176 (84.6%)	172 (70.3%)
Free School Meals (p = .064)		
Mean (SD)	15.11 (6.35)	15.90 (6.34)
Physical activity (p = .008, d = 0.07)		
Mean (SD)	4.41 (2.21)	4.04 (2.43)

Measures

The survey itself was originally developed through a series of stages of pilot work and review. The final instrument consisted of 78 questions assessing a wide range of health and well-being behaviors.

Control Variables

The primary analyses controlled for several demographic features: gender; school-stage; and free school meals at the school level (used as a proxy for socioeconomic status). Ethnicity was also controlled for, comparing White ("White Scottish", "White Other British") with all others. In addition, whether young people currently smoked (no, yes), drank tea or coffee (no, yes), reported ever using illegal drugs (no, yes), and/or using alcohol in the past year ('Never' vs 'Once or twice a year' or more often) were used as control variables because of their association with sleep problems (Ludden & Wolfson, 2010; Roberts et al., 2011). For the same reason, exercise (Loprinzi & Cardinal, 2011) was assessed using the number of days over the preceding week where students reported engaging in more than one hour of exercise ("*active enough to make you breathe harder and/or become sweaty*"). Finally, due to the high degree of overlap between symptoms of depression and insomnia (Lewinsohn et al., 1998), symptoms of depression were assessed using four items: "I've felt unhappy, sad or depressed", "I've felt hopeless about the future", "I've felt tense or nervous", and "I've worried too much about things." Participants were asked to report how often they had experienced each symptom during the preceding month. Each item was rated on a three-point scale (0 = 'Never', 1 = 'Sometimes', 2 = 'Most of the time') and these were summed to produce a score which varied from 0 – 8 (Cronbach's alpha = .72).

Involvement in Bullying — Participants were asked to report whether they had "*been bullied in the past year*" in their school (no, yes) and/or elsewhere (no, yes). They were also asked to report whether they had "*bullied or frightened someone in this school in the past year*", with possible responses 'Never', 'Sometimes', 'Often', and 'Very often'. A composite variable was then created which indicated participants' involvement in bullying: Uninvolved young people were neither bully nor victim, Pure Victims were victims of bullying (either inside or outside of school) but were not involved in bullying others, Pure Bullies were involved in bullying others ('Sometimes' or more often) but were not victims of bullying, and Bully-Victims were both bullies and victims.

Worry — Participants were presented with a list of 20 different worries (e.g., "*Money problems*", "*The way I look*", "*Exams*", etc.), and were asked to tick all that applied to them. Overall, 16.0% of students *(n*= 837) reported that they were worried about "*Being bullied*". The extent to which each worry was reported is shown in Table 3, both overall and by victim status. Being a victim of bullying was significantly associated with greater reports of all forms of worry except for 'Worry about Exams'. Of particular note is 'Worry about Being Bullied' where the disparity between victims' and non-victims' level of worry was largest.

Sleep Difficulties — Participants were asked how many times during the previous month they had "*felt too tired to do things*", "*had trouble getting to sleep*", and "*had trouble staying asleep*". These three items reflect three of the four core symptoms of insomnia as outlined in DSM-V (APA, 2013) i.e. difficulty initiating sleep, difficulty maintaining sleep, and non-restorative sleep. The fourth area mentioned in the DSM-V, distress or impairment relating to sleep and sleeping patterns, was not evaluated. Each item was rated on a three-point scale (0 = 'Never', 1 = 'Sometimes', 2 = 'Most of the time') and these were summed to produce a score which varied from 0 – 6 (Cronbach's alpha = .56).

Table 3

Percentage of 'Yes' Reports for Each Type of Worry, Overall and By Victim Status

		Victim of Bullying*	
Worry	**Overall**	**No**	**Yes**
School	39.2	38.5	51.6
Being Bullied	15.7	9.0	51.8
Money Problems	24.3	23.8	34.0
The Way I Look	35.7	34.4	52.3
Boyfriend/Girlfriend	17.6	16.5	28.3
Exams	54.6	56.6	57.9
Loneliness	15.4	12.2	34.5
Family Rows	28.0	27.3	40.0
Relationships with Parents/Carers	14.7	13.3	26.4
Drugs	11.4	10.1	19.9
Getting a Job	24.6	23.8	34.0
Being Talked About	31.7	29.2	52.0
My Health	21.9	20.1	34.6
Friends	23.5	21.2	41.6
Skin Problems	17.6	17.1	24.6
Brothers/Sisters	14.0	12.7	23.9
Fear of Violence/Gangs	20.4	17.8	36.4
Family Health Problems	18.2	17.7	25.4
The Future	36.8	36.4	48.0
Drinking	10.5	9.1	19.3

*Victim status was significantly associated ($p < .001$) with preponderance of all worries except for 'Worry about Exams' where victims and non-victims did not differ.

Statistical Analyses

To identify students with serious sleep difficulties, we constructed a sleep difficulty group, based on the estimate that 5 – 10% of young people meet diagnostic criteria for insomnia (Johnson et al., 2006; Roberts et al., 2008). The 5% of young people with the most serious difficulties are also at most at risk for internalizing difficulties (Paavonen, Solantaus, Almqvist, & Aronen, 2003), difficulties which are also prominent for those involved in bullying problems (Hawker & Boulton, 2000). The sleep difficulty group therefore consisted of students who scored 5 or 6 on the six-point sleep scale. This cut off point created a sleep difficult group of 249 young people (4.6% of the total sample).

To address our first aim, a hierarchical binary logistic regression analysis was employed, regressing sleep difficulty group membership onto the control variables at Step 1, and the involvement in bullying variable at Step 2. For the bullying involvement variable, the Uninvolved students served as the comparison group. To address our second aim another hierarchical binary logistic regression analysis was conducted, with the same variables entered at Step 1. However, at Step 2 Victim status was entered along with the Worry variable. At Step 3, an interaction term, Victim status X Worry was entered.

Results

As shown in Table 2, the sleep difficulties group is populated by more girls, non-White adolescents, smokers, drug-takers, tea/coffee drinkers, and adolescents who worry about bullying. Those in the sleep difficulties group also evidenced slightly lower physical activity levels but did not differ on levels of free school meals. A higher proportion of the sleep difficulty group consists of Pure Bullies, Pure Victims and Bully-Victims than is the case for the group without sleep difficulties.

Bullying Group Membership and Sleep Difficulties

The results of the first hierarchical binary logistic regression are shown in Table 4. The first step in the analysis accounted for approximately 20.6% of the variance (Model *Nagelkerke* R^2 = .21). The only significant predictor was depressive symptomatology. For each unit increase in depressive symptomatology, young people were 1.89 times more likely to be in the sleep difficulty group. Given that depressive symptomology was assessed on a 9-point scale, this is a very large effect. The second step in the analysis added approximately 1.3% to the variance accounted for (Model *Nagelkerke* R^2 = .22). Victims (unadjusted *OR* = 3.11) and bullies (unadjusted *OR* = 2.32) were almost twice as likely as uninvolved young people to experience sleep difficulties, while bully-victims (unadjusted *OR* = 9.50) were almost three times more likely to experience these difficulties compared to uninvolved young people.

Table 4

Binary Logistic Regression Analysis Results[a] *Predicting Likelihood of Sleep Difficulty Group Membership*

	Step 1			Step 2		
Variable	***B (SE)***	**Wald**	***OR* [95% CI]**	***B (SE)***	**Wald**	***OR* [95% CI]**
School FSM	0.01 (0.01)	0.89	1.01 [0.99, 1.03]	0.01 (0.01)	1.05	1.01 [0.99, 1.03]
Gender[b]	-0.16 (0.16)	0.96	0.86 [0.62, 1.17]	-0.27 (0.17)	2.58	0.77 [0.55, 1.07]
Ethnicity[c]	-0.16 (0.38)	0.19	0.85 [0.41, 1.77]	-0.13 (0.38)	0.11	0.88 [0.42, 1.85]
School-Stage	-0.06 (0.05)	1.25	0.94 [0.85, 1.05]	-0.02 (0.06)	0.17	0.98 [0.88, 1.09]
Tea/coffee[d]	0.02 (0.32)	0.01	1.02 [0.54, 1.92]	0.06 (0.33)	0.03	1.06 [0.56, 2.02]
Alcohol[d]	0.14 (0.19)	0.55	1.15 [0.79, 1.68]	0.12 (0.19)	0.41	1.13 [0.78, 1.65]
Drugs[d]	0.33 (0.21)	2.53	1.39 [0.93, 2.09]	0.21 (0.22)	2.25	1.37 [0.91, 2.07]
Smoke[d]	0.31 (0.23)	1.80	1.36 [0.87, 2.14]	0.22 (0.24)	0.87	1.25 [0.79, 1.98]
Exercise	0.05 (0.04)	1.78	1.05 [0.98, 1.13]	0.05 (0.04)	1.18	1.05 [0.98, 1.13]
Depression	0.62 (0.04)***	212.70	1.86 [1.71, 2.03]	0.58 (0.04)***	170.12	1.78 [1.63, 1.94]
Pure Victim[e]				0.54 (0.24)*	5.01	1.72 [1.07, 2.75]
Pure Bully[e]				0.59 (0.23)**	6.80	1.80 [1.16, 2.81]
Bully-Victim[e]				1.06 (0.27)***	15.58	2.90 [1.71, 4.92]

[a]For dichotomous categorical variables, 0 was the reference category. [b]0=female, 1=male. [c]0=Non-White, 1=White. [d]0=No, 1=Yes. [e]Comparison group was the 'Uninvolved' participants.

*p < .05. **p < .01. ***p < .001.

Victim Status, Sleep Difficulties, and Moderation by Worry

The results of the hierarchical binary logistic regression addressing our second aim are shown in Table 5.

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Table 5

Binary Logistic Regression Analysis Results[a] *Predicting Likelihood of Sleep Difficulty Group Membership*

	Step 1			Step 2			Step 3		
Measures	***B (SE)***	**Wald**	***OR* (95% CI)**	***B (SE)***	**Wald**	***OR* (95% CI)**	***B (SE)***	**Wald**	***OR* (95% CI)**
School FSM	0.01 (0.01)	0.27	1.01 [0.98, 1.02]	0.01 (0.01)	0.31	1.01 [0.99, 1.03]	0.01 (0.01)	0.24	1.01 [0.99, 1.02]
Gender[b]	-0.20 (0.18)	1.27	0.82 [0.57, 1.16]	-0.25 (0.18)	1.95	0.78 [0.54, 1.11]	-0.25 (0.18)	1.94	0.78 [0.54, 1.11]
Ethnicity[c]	-0.22 (0.41)	0.28	0.81 [0.36, 1.79]	-0.22 (0.41)	0.28	0.80 [0.36, 1.80]	-0.23 (0.41)	0.30	0.80 [0.36, 1.79]
School-Stage	-0.06 (0.06)	1.02	0.94 [0.84, 1.06]	-0.02 (0.06)	0.14	0.98 [0.87, 1.10]	-0.02 (0.06)	0.10	0.98 [0.87, 1.11]
Tea/coffee[d]	0.01 (0.34)	0.00	1.01 [0.52, 1.97]	0.00 (0.35)	0.00	1.03 [0.51, 1.99]	0.00 (0.35)	0.00	1.00 [0.50, 1.99]
Alcohol[d]	0.12 (0.21)	0.34	1.13 [0.75, 1.67]	0.12 (0.21)	0.30	1.12 [0.74, 1.69]	0.12 (0.21)	0.32	1.13 [0.75, 1.70]
Drugs[d]	0.24 (0.23)	1.08	1.27 [0.81, 2.01]	0.26 (0.23)	1.23	1.30 [0.82, 2.05]	0.26 (0.23)	1.18	1.29 [0.82, 2.04]
Smoke[d]	0.32 (0.27)	1.47	1.38 [0.82, 2.33]	0.29 (0.27)	1.13	1.33 [0.79, 2.26]	0.30 (0.27)	1.21	1.34 [0.79, 2.28]
Exercise	0.03 (0.04)	0.51	1.03 [0.95, 1.11]	0.03 (0.04)	0.56	1.03 [0.95, 1.11]	0.03 (0.04)	0.60	1.03 [0.95, 1.11]
Depression	0.64 (0.05)***	181.98	1.90 [1.73, 2.09]	0.60 (0.05)***	140.46	1.81 [1.64, 2.02]	0.60 (0.05)***	140.25	1.82 [1.64, 2.00]
Victim[d]				0.73 (0.22)**	10.92	2.08 [1.35, 3.21]	0.86 (0.28)**	9.42	2.36 [1.36, 4.08]
Worry about being bullied				-0.06 (0.23)	0.08	0.94 [0.60, 1.47]	0.07 (0.29)	0.06	1.08 [0.61, 1.92]
Victim[d*] X Worry							-0.31 (0.44)	0.50	0.74 [0.31, 1.73]

[a]For dichotomous categorical variables, 0 was the reference category. [b]0=female, 1=male. [c]0=Non-White, 1=White. [d]0=No, 1=Yes.

*p < .05. **p < .01. ***p < .001.

The first step in the analysis accounted for approximately 20.9% of the variance (Model *Nagelkerke* R^2 = .21). As before, the only significant predictor was depressive symptomatology. The second step in the analysis added approximately 0.9% to the variance accounted for (Model *Nagelkerke* R^2 = .22). Victims were twice as likely as non-victims to report sleep difficulties (unadjusted odds ratio = 3.11), and worry about being bullied was not a significant predictor (unadjusted odds ratio = 2.34). The third step in the analysis did not account for any unique variance for (Model *Nagelkerke* R^2 = .22) and the interaction term was not significant.

Discussion

The results presented here extend those of previous research reporting that young people involved in bullying experience sleep difficulties (Biebl et al., 2011; Fekkes et al., 2006; Fleming & Jacobsen, 2009; Sourander et al., 2010). Importantly, this effect was demonstrated even after controlling for the effects of a number of variables known to be associated with sleep difficulties. Finally, worry about being bullied did not predict sleep difficulties and neither did it moderate the relationship between victimization and sleep difficulties.

The association between being bullied and reporting quite serious sleep difficulties was found here despite controlling for a number of potential confounding variables. Given the cross-sectional nature of the data, caution is warranted in respect of inferring causality. However, previous research using a cross-lagged design has supported a one-way direction of causal effect from victimization to sleep difficulty (Fekkes et al., 2006), and our results indicate that this effect is robust. Regarding directionality in the association between being a bully and sleep problems, there is strong evidence suggesting that effects between adolescent sleep difficulties and aggression are bidirectional (Meijer et al., 2010). The present findings are consistent with the proposition that reciprocal links hold true for bullying (a sub-type of aggression), though longitudinal research is needed to examine this association further.

Worry neither predicted sleep problem status nor moderated the association between peer-victimization and sleep problems. This contradicts what we might expect based upon cognitive theories of insomnia (Espie, 2002; Harvey, 2002), at least with respect to worry about a specific stressor occurring in the young person's life. It is possible that 'worry' as a risk factor and as a moderator of the relationships between stressors and insomnia may manifest itself via worry about sleep itself (e.g., a young person worrying about whether she or he will be able to fall asleep: Gregory et al., 2008) which we did not assess. Alternatively, our results may indicate that the sleep difficulties group we selected are qualitatively different from what could be expected of a clinically diagnosed group of young people with insomnia, and therefore the etiology of the difficulties may also differ. If we accept that the link between victimization and sleep difficulties is not because young people are worried about being bullied, then it follows that some other explanatory variable must account for this. Future research could address the possibility that victimization provokes a state of heightened physiological arousal, which in turn impacts on sleep.

Our results also indicate that it is important to consider the status of those involved in bullying problems when seeking to address sleep difficulties. Our results indicate that bully-victims are most at risk of experiencing problems, though they also indicate that both pure-victims *and* pure-bullies are likely to experience problems with sleep too. Our results for all three groups were very similar to those of Sourander et al. (2010) in terms of effect sizes (odds ratios) despite their study focussing on involvement in cyber-bullying. The other study which we are aware of which included bully-victims (Houbre et al., 2006) found no effect of bullying role on sleep problems. However, an important difference between Houbre et al. and both ours and Sourander et al.'s studies is that the former involved 9-12 year olds where as both of the latter involved children and young people aged between 11 and 17

years old. This suggests that there may be a developmental trend in the emergence of sleep difficulties associated with involvement in bullying, i.e. that this relationship only emerges in later childhood/early adolescence. It would be helpful for future research to consider such a hypothesis using data from middle childhood to late adolescence.

Although not an aim of this paper, the degree to which status as a victim was associated with *all* forms of worry was striking. This supports the contention that these young people experience multiple forms of disadvantage and that they have a diverse range of psycho-social challenges to overcome (Finkelhor, Ormrod, & Turner, 2007; Vaillancourt, Miller, Fagbemi, Côté, & Tremblay, 2007; Wolke, Woods, Stanford, & Schulz, 2001).These data highlight the importance, for anti-bullying policies relating to victims, of engaging with each young person's overall situation rather than trying to tackle victimisation as though it were an isolated problem.

A limitation of the current study is that it is based upon self-reports. These have sometimes been criticized by sleep researchers as being subject to specific biases, such as insomnia patients overestimating how long it takes them to fall asleep (Harvey & Tang, 2012). The reliance on self-reports for all measures could also be a criticism of the study, though methods variance may be less problematic than is sometimes suggested (Spector, 2006). A further limitation of our study is that we have included young people ranging in age from pre-adolescence to late-adolescence. Sleep patterns and sleep requirements vary across this group (see Wolfson & Carskadon, 1998) and so future work in this area may usefully focus on sub-groups of specific ages to examine in moderating and mediating factors linking victimization and sleep differ during different periods of childhood and adolescence.

It is also true that the measures used here were not established 'gold-standard' measures (e.g., Children's Depression Inventory: Kovacs, 1985). We would have preferred the use of such measures, but had no input into choice of instrument. However, the items used here closely approximate the items and conceptual scope of established measures of, for example, depressive symptomatology and sleep, and have strong face validity with expressed descriptions of common sleep problems. The prevalence of being bullied reported here (11.1%) also supports the adequacy of the measures used as it closely approximates that of previous studies using Scottish samples: Due et al. (2005: 9.4% among 11-15 year olds); Sweeting, Young, West, and Der (2006: 15% reducing to 10% for 11-15 year olds); and, Hunter, Boyle, and Warden (2007: 11.7% among 8-13 year olds). Furthermore, a clear benefit of the database is that it includes a large sample of adolescents from many schools, completing numerous items on various topics and hence with minimal risk of demand characteristics bearing on responses. As such, this study serves as an excellent foundation from which future research can build.

In summary, this study extends previous research by highlighting the salience of involvement in bullying for adolescents' sleep difficulties. Young people who are bullied experience increases in the likelihood that they will report serious sleep difficulties. This finding is obtained even after controlling for other variables which have been shown to be related to sleep difficulties. Bullied students are also likely to evidence high levels of sleep difficulty, though most at risk as those students who both experience and use bullying behaviors ('bully-victims'). This study also evaluated whether stressor-specific worry could act as a moderator of the relationship between victimization and reports of sleep difficulties. Here, we did not find support for predictions drawn from cognitive models of insomnia. However, the differing ways in which worry can be conceptualized suggest that this model may yet help us to understand risk and resilience in the context of victimization and sleep difficulty.

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Competing Interests

The authors have declared that no competing interests exist.

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References

Alfano, C. A., Zakem, A. H., Costa, N. M., Taylor, L. K., & Weems, C. F. (2009). Sleep problems and their relation to cognitive factors, anxiety, and depressive symptoms in children and adolescents. *Depression and Anxiety, 26*, 503-512.

American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed.). Arlington, VA: Author.

Berthold, K. A., & Hoover, J. H. (2000). Correlates of bullying and victimization among intermediate students in the Midwestern USA. *School Psychology International, 21*, 65-78. doi:10.1177/0143034300211005

Biebl, S. J. W., DiLalla, L. F., Davis, E. K., Lynch, K. A., & Shinn, S. O. (2011). Longitudinal associations among peer victimization and physical and mental health problems. *Journal of Pediatric Psychology, 36*(8), 868-877. doi:10.1093/jpepsy/jsr025

Boulton, M. J., & Smith, P. K. (1994). Bully/victim problems in middle-school children: Stability, self-perceived competence, peer-perceptions and peer-acceptance. *British Journal of Developmental Psychology, 12*, 315-329. doi:10.1111/j.2044-835X.1994.tb00637.x

Dregan, A., & Armstrong, D. (2010). Adolescence sleep disturbances as predictors of adulthood sleep disturbances: A cohort study. *The Journal of Adolescent Health, 46*, 482-487. doi:10.1016/j.jadohealth.2009.11.197

Due, P., Holstein, B. E., Lynch, J., Diderichsen, F., Gabhain, S. N., Scheidt, P., . . . The Health Behaviour in School-Aged Children Bullying Working Group. (2005). Bullying and symptoms among school-aged children: International comparative cross sectional study in 28 countries. *European Journal of Public Health, 15*(2), 128-132. doi:10.1093/eurpub/cki105

Espie, C. A. (2002). Insomnia: Conceptual issues in the development, persistence, and treatment of sleep disorder in adults. *Annual Review of Psychology, 53*, 215-243. doi:10.1146/annurev.psych.53.100901.135243

Fekkes, M., Pijpers, F. I. M., Fredriks, A. M., Vogels, T., & Verloove-Vanhorick, S. P. (2006). Do bullied children get ill, or do ill children get bullied? A prospective cohort study on the relationship between bullying and health-related symptoms. *Pediatrics, 117*(5), 1568-1574. doi:10.1542/peds.2005-0187

Finkelhor, D., Ormrod, R. K., & Turner, H. A. (2007). Polyvictimization and trauma in a national longitudinal cohort. *Development and Psychopathology, 19*, 149-166. doi:10.1017/S0954579407070083

Fleming, L. C., & Jacobsen, K. H. (2009). Bullying and symptoms of depression in Chilean middle school students. *The Journal of School Health, 79*(3), 130-137. doi:10.1111/j.1746-1561.2008.0397.x

Gini, G., & Pozzoli, T. (2009). Association between bullying and psychosomatic problems: A meta-analysis. *Pediatrics, 123*, 1059-1065. doi:10.1542/peds.2008-1215

Gregory, A. M., & Eley, T. C. (2005). Sleep problems, anxiety and cognitive style in school-aged children. *Infant and Child Development, 14*, 435-444. doi:10.1002/icd.409

Gregory, A. M., Willis, T. A., Wiggs, L., Harvey, A. G., & STEPS team. (2008). Presleep arousal and sleep disturbances in children. *SLEEP, 31*(12), 1745-1747.

Harvey, A. G. (2002). A cognitive model of insomnia. *Behaviour Research and Therapy, 40*, 869-893. doi:10.1016/S0005-7967(01)00061-4

Harvey, A. G., & Tang, N. K. Y. (2012). (Mis)perception of sleep in insomnia: A puzzle and a resolution. *Psychological Bulletin, 138*(1), 77-101. doi:10.1037/a0025730

Hawker, D. S. J., & Boulton, M. J. (2000). Twenty years' research on peer victimisation and psychosocial maladjustment: A meta-analytic review of cross-sectional studies. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 41*(4), 441-455. doi:10.1111/1469-7610.00629

Hildenbrand, A. K., Daly, B. P., Nicholls, E., Brooks-Holliday, S., & Kloss, J. D. (2013). Increased risk for school violence-related behaviors among adolescents with insufficient sleep. *The Journal of School Health, 83*(6), 408-414. doi:10.1111/josh.12044

Holmberg, L. I., & Hellberg, D. (2008). Behavioral and other characteristics of relevance for health in adolescents with self-perceived sleeping problems. *International Journal of Adolescent Medicine and Health, 20*(3), 353-366. doi:10.1515/IJAMH.2008.20.3.353

Houbre, B., Tarquinio, C., Thuillier, I., & Hergott, E. (2006). Bullying among students and its consequences on health. *European Journal of Psychology of Education, 21*(2), 183-208. doi:10.1007/BF03173576

Hunter, S. C., Boyle, J. M. E., & Warden, D. (2007). Perceptions and correlates of peer-victimization and bullying. *British Journal of Educational Psychology, 77*(4), 797-810. doi:10.1348/000709906X171046

Johnson, E. O., & Breslau, N. (2001). Sleep problems and substance use in adolescence. *Drug and Alcohol Dependence, 64*(1), 1-7. doi:10.1016/S0376-8716(00)00222-2

Johnson, E. O., Roth, T., Schultz, L., & Breslau, N. (2006). Epidemiology of DSM-IV insomnia in adolescence: Lifetime prevalence, chronicity, and an emergent gender difference. *Pediatrics, 117*, e247-e256. doi:10.1542/peds.2004-2629

Kataria, S., Swanson, M. S., & Trevathan, G. E. (1987). Persistence of sleep disturbances in preschool children. *The Journal of Pediatrics, 110*, 642-646. doi:10.1016/S0022-3476(87)80571-1

Kochel, K. P., Ladd, G. W., & Rudolph, K. D. (2012). Longitudinal associations among youth depressive symptoms, peer victimization, and low peer acceptance: An interpersonal process perspective. *Child Development, 83*(2), 637-650.

Kovacs, M. (1985). The Children's Depression Inventory (CDI). *Psychopharmacology Bulletin, 21*, 995-998.

Lewinsohn, P. M., Rohde, P., & Seeley, J. R. (1998). Major depressive disorder in older adolescents: Prevalence, risk factors, and clinical implications. *Clinical Psychology Review, 18*(7), 765-794. doi:10.1016/S0272-7358(98)00010-5

Loprinzi, P. D., & Cardinal, B. J. (2011). Association between objectively-measured physical activity and sleep, NHANES 2005–2006. *Mental Health and Physical Activity, 4*, 65-69. doi:10.1016/j.mhpa.2011.08.001

Ludden, A. B., & Wolfson, A. R. (2010). Understanding adolescent caffeine use: Connecting use patterns with expectancies, reasons, and sleep. *Health Education & Behavior, 37*, 330-342. doi:10.1177/1090198109341783

Meijer, A. M., Reitz, E., Deković, M., van den Wittenboer, G. L. H., & Stoel, R. D. (2010). Longitudinal relations between sleep quality, time in bed and adolescent problem behaviour. *Journal of Child Psychology and Psychiatry, 51*(11), 1278-1286. doi:10.1111/j.1469-7610.2010.02261.x

Muris, P., Roelofs, J., Meesters, C., & Boomsma, P. (2004). Rumination and worry in nonclinical adolescents. *Cognitive Therapy and Research, 28*(4), 539-554. doi:10.1023/B:COTR.0000045563.66060.3e

Natvig, G. K., Albrektsen, G., & Qvarnstrøm, U. (2001). Psychosomatic symptoms among victims of school bullying. *Journal of Health Psychology, 6*(4), 365-377. doi:10.1177/135910530100600401

Nishina, A. (2012). Microcontextual characteristics of peer victimization experiences and adolescents' daily well-being. *Journal of Youth and Adolescence, 41*, 191-201. doi:10.1007/s10964-011-9669-z

Nishina, A., & Bellmore, A. (2010). When might peer aggression, victimization, and conflict have its largest impact? Microcontextual considerations. *The Journal of Early Adolescence, 30*(1), 5-26. doi:10.1177/0272431609350928

Olweus, D. (2012). Cyberbullying: An overrated phenomenon? *European Journal of Developmental Psychology, 9*(5), 520-538. doi:10.1080/17405629.2012.682358

Paavonen, E. J., Solantaus, T., Almqvist, F., & Aronen, E. T. (2003). Four-year follow-up study of sleep and psychiatric symptoms in preadolescents: Relationship of persistent and temporary sleep problems to psychiatric symptoms. *Journal of Developmental and Behavioral Pediatrics, 24*(5), 307-314. doi:10.1097/00004703-200310000-00001

Rivers, I., & Noret, N. (2013). Potential suicide ideation and its association with observing bullying at school. *The Journal of Adolescent Health, 53*, S32-S36. doi:10.1016/j.jadohealth.2012.10.279

Roberts, R. E., Roberts, C. R., & Duong, H. T. (2008). Chronic insomnia and its negative consequences for health and functioning of adolescents: A 12-month prospective study. *The Journal of Adolescent Health, 42*, 294-302. doi:10.1016/j.jadohealth.2007.09.016

Roberts, R. E., Roberts, C. R., & Xing, Y. (2011). Restricted sleep among adolescents: Prevalence, incidence, persistence, and associated factors. *Behavioral Sleep Medicine, 9*(1), 18-30. doi:10.1080/15402002.2011.533991

Schoffstall, C. L., & Cohen, R. (2011). Cyber aggression: The relation between online offenders and offline social competence. *Social Development, 20*(3), 587-604. doi:10.1111/j.1467-9507.2011.00609.x

Scottish Government. (2010). *School meals in Scotland*. Edinburgh, United Kingdom: Author.

Shakoor, S., Jaffee, S. R., Bowes, L., Ouellet-Morin, I., Andreou, P., Happé, F., . . . Arsenault, L. (2012). A prospective longitudinal study of children's theory of mind and adolescent involvement in bullying. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 53*(3), 254-261. doi:10.1111/j.1469-7610.2011.02488.x

Smith, P. K., Mahdavi, J., Carvalho, M., Fisher, S., Russell, S., & Tippett, N. (2008). Cyberbullying: Its nature and impact in secondary school pupils. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 49*(4), 376-385. doi:10.1111/j.1469-7610.2007.01846.x

Sourander, A., Klomek, A. B., Ikonen, M., Lindroos, J., Luntamo, T., Koskelainen, M., . . . Helenius, H. (2010). Psychosocial risk factors associated with cyberbullying among adolescents. *Archives of General Psychiatry, 67*(7), 720-728. doi:10.1001/archgenpsychiatry.2010.79

Spector, P. E. (2006). Method variance in organizational research: Truth or urban legend? *Organizational Research Methods, 9*, 221-232. doi:10.1177/1094428105284955

Sweeting, H., Young, R., West, P., & Der, G. (2006). Peer victimization and depression in early-mid adolescence: A longitudinal study. *British Journal of Educational Psychology, 76*(3), 577-594. doi:10.1348/000709905X49890

Tochigi, M., Nishida, A., Shimodera, S., Oshima, N., Inoue, K., Okazaki, Y., & Sasaki, T. (2012). Irregular bedtime and nocturnal cellular phone usage as risk factors for being involved in bullying: A cross-sectional survey of Japanese adolescents. *PLoS ONE, 7*(9), e45736. doi:10.1371/journal.pone.0045736

Ttofi, M. M., Farrington, D. P., Lösel, F., & Loeber, R. (2011). The predictive efficiency of school bullying versus later offending: A systematic/meta-analytic review of longitudinal studies. *Criminal Behaviour and Mental Health, 21*, 80-89. doi:10.1002/cbm.808

Vaillancourt, T., Miller, J. L., Fagbemi, J., Côté, S., & Tremblay, R. E. (2007). Trajectories and predictors of indirect aggression: Results from a nationally representative longitudinal study of Canadian children aged 2-10. *Aggressive Behavior, 33*, 314-326. doi:10.1002/ab.20202

Wolfson, A. R., & Carskadon, M. A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development, 69*(4), 875-887. doi:10.1111/j.1467-8624.1998.tb06149.x

Wolke, D., Woods, S., Stanford, K., & Schulz, H. (2001). Bullying and victimization of primary school children in England and Germany: Prevalence and school factors. *British Journal of Psychology, 92*, 673-696. doi:10.1348/000712601162419

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